The confusing (and ongoing) story of iPS vs. embryonic stem cells

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It appears we weren't the only people to notice last week's convergence of reprogrammed iPS cell news -- first they are made better, then they are suggested to be worthless. USA Today ran a story summing up several years' worth of such news. (For those not up-to-speed on iPS cells, you can watch this video with UCLA's Jerome Zack talking about how the cells are made.)

The story goes something like this: One day, iPS cells reprogrammed from adult tissue are going to eliminate the need for embryonic stem cells. No destroying embryos!

Soon after, someone points out that the creation of iPS cells -- though cool -- requires inserting cancer-causing genes. Not good! They cause cancer! But then someone finds a better way, with no cancer genes. Good! But then iPS cells are shown to differ dramatically from embryonic stem cells. And they don't seem quite as willing to form all tissues. Confusing!

According to the USA Today story:

> "Basically, we are looking at a lot of confusion," says Harvard stem cell scientist Alexander Meissner. "That's not to say one group is wrong and another is right. We have been making a lot of progress, but everyone is looking at the same problems from different sides."

The story mentioned last week's paper by Salk researchers showing a molecular memory in iPS cells and went on:

> Combined with a September Nature paper showing similar memory signatures in mouse IPS cells and Scripps Research Institute researchers last month reporting more cancer genes in IPS cells compared to embryonic ones, things looked bad . "The finding suggests that (induced) cells may not be suitable substitutes for (embryonic) cells in modeling or treating disease," noted Nature science reporter Elie Dolgin.

Although iPS cells are clearly the source of some confusion in terms of their similarity to embryonic stem cells, they are still a great tool for mimicking disease. CIRM researchers at Salk have taken skin cells from people with ALS, matured those cells in a lab dish into the cells involved in the disease and learned details about the biology of that disease that would never have been possible without reprogrammed cells. (Here's a video about that work.)

Other grantees at the Parkinson's Research Institute are taking skin from people with Parkinson's disease, maturing those into the neurons involved in that disease, and using those cells that are genetically included to form Parkinson's disease to understand the disease and test drugs. (This video includes scientists at the Parkinson's Institute talking about that work.)

At Gladstone, CIRM grantees are generating heart tissue from the skin of people with genetic heart diseases and using those cells to screen drugs. (You can watch a video of Bruce Conklin talking about that work.)

In each case, it doesn't matter that iPS cells are not identical to embryonic stem cells. It matters that they are currently the only way to study mature disease-prone cells in a lab dish. Because those people with Parkinson's disease aren't giving up brain tissue and the heart disease patients aren't loaning out little chunks of their heart. But skin they can part with.

USA Today ends their story by instructing readers to hang on for a bumpy ride ahead as scientists resolve the meaning of the differences between iPS and embryonic stem cells. One day we'll know which cell type provides the best tool for treating and studying different diseases. In the mean time, USA Today is likely right that the ride won't be dull.

- A.A.

Tags: Gage, parkinson's Institute, Conklin, Gladstone, iPS, Scripps, Salk Institute

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